IN THE CLAIMS:

5. (amended) An integrated~~, unitary~~ spectrometer assembly, comprising:

a substrate having thereon a plurality of optical sensors and one or more processing elements;

a plurality of filter~~[s]~~ elements fixedly positioned over at least a first group of the optical sensors fixedly and fixedly positioned with respect to the substrate, wherein the plurality of filter~~[s]~~ elements provide filters that have spectral transmission characteristics over a predetermined spectrum;

an optical manifold comprising at least a fiber optic bundle having at least one input and a plurality of outputs fixedly positioned over at least certain of the plurality of filters and fixedly positioned with respect to the substrate, ~~[wherein the optical manifold has a plurality of exit windows and at least one entrance port,]~~ wherein light entering the ~~[entrance port]~~ input is transmitted to an interior portion of the optical manifold, wherein at least a portion of the light is transmitted from the ~~[exit ports]~~ outputs through at least certain of the filters for ~~sensors~~ sensing by at least certain of the optical sensors;

wherein light may be coupled to the ~~[entrance port]~~ input, wherein at least first spectral data corresponding to the light is generated by the one or more processing elements, wherein the spectrometer assembly is fabricated in a unitary manner ~~on~~ with respect to the substrate.

6. The assembly of claim 5, wherein the sensors comprise sensors that generate at least one signal having a frequency proportional to the light intensity received by the one or more sensors.

7. The assembly of claim 6, wherein the at least one signal comprises a digital signal.

8. The assembly of claim 7, wherein the digital signal comprises a TTL or CMOS digital signal.

9. The assembly of claim 6, wherein one or more spectral characteristics are determined based on measuring a period of a plurality of digital signals produced by a plurality of sensors.

10. The assembly of claim 6, wherein the signal comprises an asynchronous signal of a frequency dependent upon the intensity of the received light.

11. The assembly of claim 6, wherein the one or more sensors comprise a plurality of light to frequency converter sensing elements.

12. The assembly of claim 6, wherein the filter elements comprises a plurality of filter portions having a wavelength dependent optical transmission property.

13. The assembly of claim 6, wherein a spectral analysis is performed based on light received from an object or material.

14. The assembly of claim 6, wherein the filter elements comprises a plurality of cut-off filter elements.

15. The assembly of claim 6, wherein the filter elements collectively comprise a color gradient filter.

16. The assembly of claim 6, wherein the filter elements collectively comprises a filter grid.

17. The assembly of claim 6, wherein received light is spectrally analyzed without using a diffraction grating.

18. (amended) The assembly of claim 6, wherein the light is received by a probe, wherein a plurality of measurements are taken at a plurality of distances of the probe with respect to ~~the~~ an object or material.

19. (amended) The assembly of claim 6, wherein a probe having one or more light sources provides light to an object or material, wherein light from the one or more light sources is received by ~~the~~ one or more light receivers from the object or material.

20. The assembly of claim 19, wherein one or more sensors determine a distance of the probe with respect to the object or material.

21. The assembly of claim 19, wherein one or more sensors determine an angle of the probe with respect to the object or material.

22. The assembly of claim 19, wherein one or more sensors determine a distance and an angle of the probe with respect to the object or material.

23. The assembly of claim 6, wherein the at least one signal having a frequency proportional to the light intensity received by the one or more sensors is generated by an integrator coupled to the one or more sensors.

24. The assembly of claim 6, wherein the sensors comprise a photo diode array.

25. (amended) An integrated~~, unitary~~ spectrometer assembly, comprising:

a substrate having thereon a plurality of optical sensors and one or more processing elements;

a plurality of filter~~[s]~~ elements fixedly positioned over at least a first group of the optical sensors ~~fixedly~~ and fixedly positioned with respect to the substrate, wherein the plurality of filter~~[s]~~ elements provide filters that have spectral transmission characteristics over a predetermined spectrum;

an optical manifold fixedly positioned over at least certain of the plurality of filters and fixedly positioned with respect to the substrate wherein the optical manifold has a plurality of exit ~~windows~~ ports and at least one entrance port, wherein light entering the entrance port is transmitted to an interior portion of the optical manifold, wherein at least a portion of the light is transmitted from the exit ports through at least certain of the filters for ~~sensors~~ sensing by at least certain of the optical sensors;

wherein light may be coupled to the entrance port, wherein at least first spectral data corresponding to the light is generated by the one or more processing elements, wherein the spectrometer assembly is ~~fabricate~~ fabricated in a unitary manner ~~on~~ with respect to the substrate.

26. The assembly of claim 25, wherein the sensors comprise sensors that generate at least one signal having a frequency proportional to the light intensity received by the one or more sensors.

27. The assembly of claim 26, wherein the at least one signal comprises a digital signal.

28. The assembly of claim 27, wherein the digital signal comprises a TTL or CMOS digital signal.

29. The assembly of claim 26, wherein one or more spectral characteristics are determined based on measuring a period of a plurality of digital signals produced by a plurality of sensors.

30. The assembly of claim 26, wherein the signal comprises an asynchronous signal of a frequency dependent upon the intensity of the received light.

31. The assembly of claim 26, wherein the one or more sensors comprise a plurality of light to frequency converter sensing elements.

32. The assembly of claim 26, wherein the filter elements comprises a plurality of filter portions having a wavelength dependent optical transmission property.

33. The assembly of claim 26, wherein a spectral analysis is performed based on light received from an object or material.

34. The assembly of claim 26, wherein the filter elements comprises a plurality of cut-off filter elements.

35. The assembly of claim 26, wherein the filter elements collectively comprise a color gradient filter.

36. The assembly of claim 26, wherein the filter elements collectively comprises a filter grid.

37. The assembly of claim 26, wherein received light is spectrally analyzed without using a diffraction grating.

38. (amended) The assembly of claim 26, wherein the light is received by a probe, wherein a plurality of measurements are taken at a plurality of distances of the probe with respect to ~~the~~ an object or material.

39. (amended) The assembly of claim 26, wherein a probe having one or more light sources provides light to an object or material, wherein light from the one or more light sources is received by ~~the~~ one or more light receivers from the object or material.

40. The assembly of claim 39, wherein one or more sensors determine a distance of the probe with respect to the object or material.

41. The assembly of claim 39, wherein one or more sensors determine an angle of the probe with respect to the object or material.

42. The assembly of claim 39, wherein one or more sensors determine a distance and an angle of the probe with respect to the object or material.

43. The assembly of claim 26, wherein the at least one signal having a frequency proportional to the light intensity received by the one or more sensors is generated by an integrator coupled to the one or more sensors.

44. The assembly of claim 26, wherein the sensors comprise a photo diode array.